Operational challenges with high penetrations of DER and status of IEEE 1547.8

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Panel 2:

Inverter Functions to Support Distributed Generation and Storage Interoperability through Communication Standards

What does California need and by when?

Issues to be presented and discussed

- What are the key distribution system ***operational challenges*** from high penetrations of Distributed Generation and Storage (including EVs)? Managing fluctuations due to renewable source variability? Managing DER power output to avoid transformer overloads and/or reverse power flow in "sensitive environments"? Managing volt/vars? Minimizing impacts from voltage and frequency deviations? Low voltage ride-through? Mitigating transmission system impacts? Coping with excess "must run" energy? Other?

- How will/should the **IEEE 1547.8** requirements address those interconnection challenges? In particular, what communication monitoring and control requirements (including autonomous, pre-set controls) for "sensitive environments" should be included?

- What **advanced DER inverter functions** are being defined that can help meet the high penetration challenges and the 1547.8 requirements? What other functions may be needed to manage high penetrations of DER, including EVs and storage?

Concerns (Potential Grid Impacts) of High Penetrations of DER

- Voltage Regulation And Real/Reactive Power Management
- Protection Design And Coordination
- Power Quality (Flicker, Harmonics, Overvoltage, Undervoltage, Sags, Swells)
- Unintentional Islanding
- Reliability (Impact On SAIDI, SAIFI, Etc.)
- Equipment Ratings

IEEE 1547 Series Standards

1547-2008 Standard for Interconnecting Distributed Resources with Electric Power Systems

1547.1-2005 Conformance Test Procedures for Equipment Interconnecting DR with EPS

1547.2-2008 Application Guide for IEEE 1547 Standard for Interconnecting DR with EPS

1547.3- 2007 Guide for Monitoring, Information Exchange and Control of DR

Current Projects

P1547.4 Guide for Design, Operation, and Integration of DR Island Systems with EPS

P1547.5 Guidelines for Interconnection of Electric Power Sources Greater Than 10 MVA to the Power Transmission Grid

P1547.6 Recommended Practice for Interconnecting DR With EPS Distribution Secondary Networks

P1547.7 Draft Guide to Conducting Distribution Impact Studies for Distributed Resource Interconnection

Microgrids

Urban distribution networks

NEW: IEEE 1547. 8 – Advanced Grid Functionality

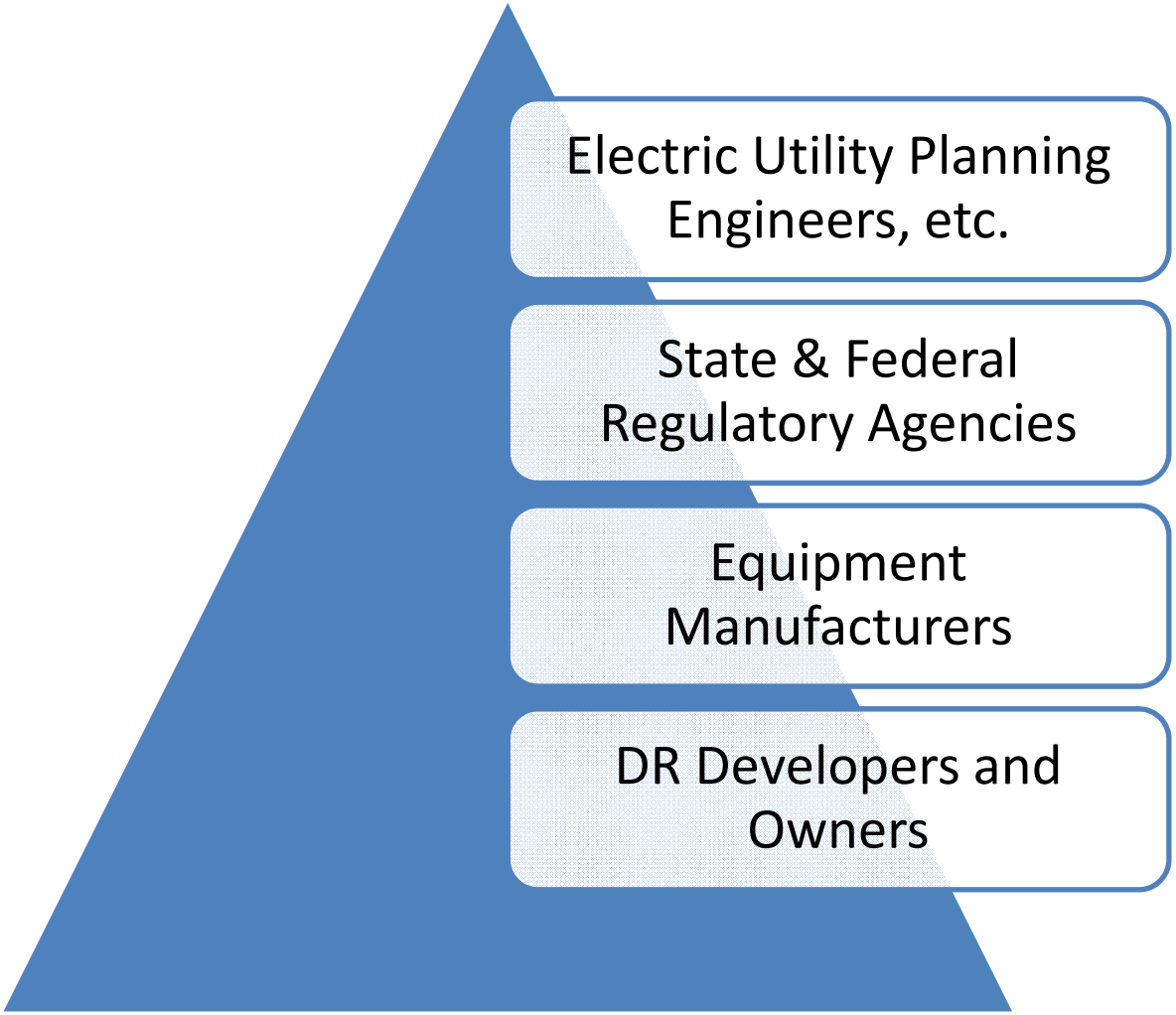
http://grouper.ieee.org/groups/scc21/index.html

IEEE P1547.8

Draft Recommended Practice for Establishing Methods and Procedures that Provide Supplemental Support for Implementation Strategies for Expanded Use of IEEE Standard 1547

Scope: *This Recommended Practice Applies To The Requirements Set Forth In IEEE Std 1547 And Provides Recommended Methods That May Expand The Usefulness And Utilization Of IEEE Std 1547 Through The Identification Of Innovative Designs, Processes, And Operational Procedures.*

Intended Audience



Focus of P1547.8

- Guide Will Reflect IEEE 1547 Clauses
- Focus on High Penetration PV (and other Distributed Generators)
- Intent is to Make PV (And All DG) Systems "Utility Friendly"
- Solutions Should Incorporate Advanced Functionality Inverters

Topics of Focus for P1547.8

- Voltage Regulation
- Monitoring & Communications
- Response to Area EPS Abnormal Conditions
- Power Quality
- Coordination with NEC and UL 1741
- Optimizing Group Behavior of DG
- DR Requirements to “See” Fault Conditions
- Additional Data Requirements
- DG Greater than 10 MW (< 20MW)

Advanced Inverter Functions (Phase 1)

1. Connect/Disconnect from Grid
2. Generation % Reduction Event
3. VAR Management
4. Control Energy Flow (To/From Storage)
5. Event/History Logging (Basic Set)
6. State/Status Reporting & Reading
7. Time-Synchronization

Advanced Inverter Functions (Phase 2)

1. Self-description Function
2. Auto Discovery
3. VAR Control
4. Voltage Management
5. Metering (All Quantities)
6. Energy Management System/Console
7. Firmware Download

P1547.8 Meetings

- Kickoff Meeting – August 2010
- Second Meeting – February 2011
- 91-page Resource Document/Draft Created After First Meeting
- Next Meeting – August 2011 (Week of August 1)